P1 1166144

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APPLICATION NUMBER: *60/455,718*
FILING DATE: *March 18, 2003*
RELATED PCT APPLICATION NUMBER: *PCT/US04/08073*

By Authority of the
COMMISSIONER OF PATENTS AND TRADEMARKS

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Certifying Officer

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JC891 U.S. PTO

PROVISIONAL APPLICATION FOR PATENT COVER SHEET

This is a request for filing a PROVISIONAL APPLICATION FOR PATENT under 37 CFR 1.53(c).

Express Mail Label No. EU 982357272 US

APPROV

101 U.S. PTO 60/455718 03/18/03

INVENTOR(S)

Given Name (first and middle [if any])	Family Name or Surname	Residence (City and either State or Foreign Country)
David Paul	Brisco	Duncan, Oklahoma
Michael Dennis	Bullock	Aberdeen, Scotland
Kevin Waddell	Karl	Houston, Texas

☐ Additional inventors are being named on the _____ separately numbered sheets attached hereto

TITLE OF THE INVENTION (500 characters max)

Tension Tool

CORRESPONDENCE ADDRESS

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Type Customer Number here

OR

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ENCLOSED APPLICATION PARTS (check all that apply)

☑ Specification Number of Pages 4

☐ CD(s), Number

☐ Drawing(s) Number of Sheets

☑ Other (specify) Return Receipt Postcard

☐ Application Data Sheet. See 37 CFR 1.76

METHOD OF PAYMENT OF FILING FEES FOR THIS PROVISIONAL APPLICATION FOR PATENT

☐ Applicant claims small entity status. See 37 CFR 1.27.

☐ A check or money order is enclosed to cover the filing fees

☑ The Commissioner is hereby authorized to charge filing fees or credit any overpayment to Deposit Account Number: 08-1394

☐ Payment by credit card. Form PTO-2038 is attached.

FILING FEE AMOUNT ($): $160.00

The invention was made by an agency of the United States Government or under a contract with an agency of the United States Government.

☑ No.

☐ Yes, the name of the U.S. Government agency and the Government contract number are: _____

Respectfully submitted, Todd Mattingly

SIGNATURE _____

TYPED or PRINTED NAME Todd Mattingly

TELEPHONE 713-547-2301

Date 03/18/2003

REGISTRATION NO. (if appropriate) 40,298

Docket Number: EGT-03-01

USE ONLY FOR FILING A PROVISIONAL APPLICATION FOR PATENT

This collection of information is required by 37 CFR 1.51. The information is used by the public to file (and by the PTO to process) a provisional application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 8 hours to complete, including gathering, preparing, and submitting the complete provisional application to the PTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, Washington, D.C. 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Box Provisional Application, Assistant Commissioner for Patents, Washington, D.C. 20231.

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EXPRESS MAIL NO. **EU 982357272 US**

DATE OF DEPOSIT: **March 18, 2003**

The Provisional Application for Patent Cover Sheet and the following 4 pages are being deposited with the U.S. Postal Service Express Mail Post Office to Addressee Service under 37 CFR §1.10 on the date indicated above and is addressed to: BOX PROVISIONAL PATENT APPLICATION, Commissioner for Patents, Washington, D.C. 20231

Vikki M. Meriwether
Name of person mailing paper and fee

Vikki M. Meriwether
Signature of person mailing paper and fee

EGT-03-01
EU 982357272
March 18, 2003

Tension Type Liner Running Tool (F03.00153)

Inventors: David Brisco, Michael Bullock and Kevin Waddell

This invention disclosure describes a tool used to carry an expandable liner into a well with the liner in tension instead of compression. Conventional expandable liners are carried into the well with a drill pipe string which is run through the liner and connected to an expansion assembly at the bottom of the liner. The weight of the liner sets down on the expansion assembly. The liner is in compression and if the liner is long enough, the liner's weight can start expansion.

With this new tool, the drill pipe string is still run through the liner and connected to the expansion assembly at the bottom of the liner, but the weight of the liner is carried through the running tool at the top of the liner. This allows the liner to be run in tension, taking the weight off the expansion cone and allowing much longer liners to be run.

The expandable liner is typically made up of casing joints that are connected with a left hand expandable casing thread with the pin thread on top and the box thread on bottom. Because of this arrangement, right hand torque must be applied to the bottom of the liner to prevent the casing thread from backing off. If right hand torque is applied to the top of the liner, it could back off a casing thread.

Description

This tool consists of a casing adapter, an internally splined cap, an anti-torque ring, an externally splined mandrel, a mandrel extension, and a coupling.

The casing adapter has the expandable left hand casing thread at the bottom, typically a box thread, and an external right hand straight thread, such as a stub acme thread, at the top. An internal thread can be used but could be damaged when the drill pipe is run into the liner.

The internally splined cap has an internal right hand straight thread at the bottom which makes up on the external right hand straight thread on the casing adapter. At the end of the internal thread is an internal shoulder against which an anti-torque ring made of a low friction material is held. The anti-torque ring allows the cap to be removed from the casing adapter if the two parts are shouldered together and tightened. Above the internal shoulder is an internal spline which will mate with an external spline on the mandrel. The spline allows torque to be transmitted from the mandrel to the cap when the splines are engaged. The internal splines on the cap are chamfered on the bottom end so they will automatically align and engage with the external splines on the mandrel when the mandrel is moved upward. Fluid ports are placed between the straight thread

and internal shoulder to allow fluid to move in and out of the annulus between the liner ID and drill pipe string OD.

The externally splined mandrel has a drill pipe connection at the bottom which connects to a drill pipe string. Above this connection is an external shoulder which can move against the internal shoulder in the cap and carry the weight of the liner. Grooves are machined across the shoulder to allow fluid movement when the mandrel is moved. Above the external shoulder is an external spline which will mate with the internal spline in the cap. These splines are chamfered at the top end so they will automatically align and engage with the internal splines in the cap when the mandrel is moved upward. Above the splines is an external straight thread and o-ring sealing surface which makes up to the mandrel extension.

The mandrel extension makes up between the mandrel and coupling and provides a length of constant OD which can move through the internal splines in the cap when the externally splined mandrel is moved downward. It is long enough to allow a slip joint in the drill pipe string below to collapse completely before the coupling shoulders against the cap. The externally splined mandrel and mandrel extension can be made in one piece.

The coupling has an internal straight thread and internal o-ring groove at the bottom which makes up to the mandrel extension. At the top end is a drill pipe connection which makes up to a drill pipe string. Various methods can be used to lock the coupling to the mandrel extension and allow left hand torque to be applied. With this tool, torque pins are driven through slots in the coupling into matching holes in the mandrel extension.

Operation

The liner is run with the launcher and expansion assembly at the bottom. The casing adapter is made up to the top of the liner. The drill pipe string is then run in the liner with the safety sub at the bottom and a slip joint above the safety sub. The safety sub has a right hand pin thread that is made up in the expansion assembly. The slip joint is designed to transmit torque only when completely extended or collapsed and lugs between the sections are engaged. When the slip joint is not completely extended or collapsed, it is in a neutral position where the lugs are not engaged and one section can rotate relative to the other without transmitting torque.

The drill pipe can be run with solid centralizers or standoffs to stiffen the liner and decrease the possibility of the liner buckling.

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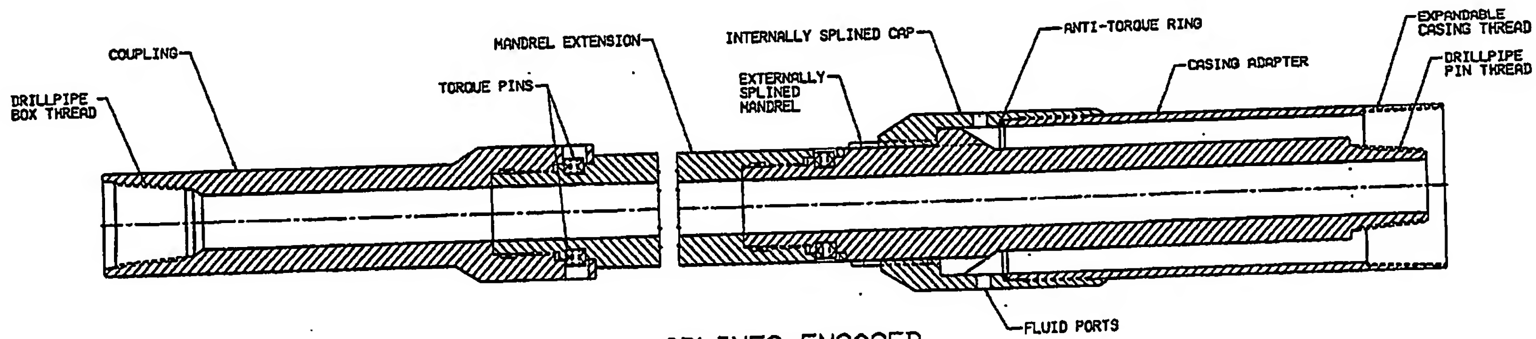
The drill pipe string must be spaced out between the safety sub and running tool with pup joints so that:

1. When the drill pipe is set down and the slip joint collapsed, the splines between the cap and mandrel are disengaged.
2. When the drill pipe string is picked up and the mandrel is shouldered against the cap and the splines are engaged, the slip joint is in a neutral position.

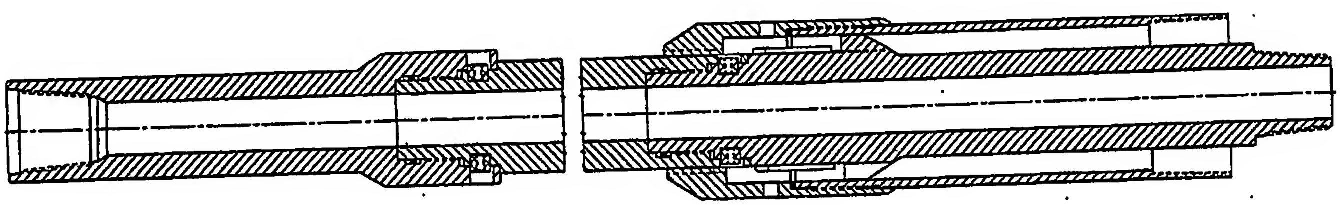
The drill pipe string is run in the liner, the safety sub set on the expansion assembly, the slip joint collapsed, and the safety sub made up in the expansion assembly with right hand rotation. The cap is then made up on the casing adapter at the top of the liner. Ideally, it is made up until it shoulders against the casing adapter and then backed off several turns. This will prevent any inadvertent right hand torque from being applied to the top of the liner. The drill pipe string is picked up until the mandrel shoulders against the cap and the splines are engaged. The liner is picked up and run in the well in tension with the liner weight carried through the cap and mandrel.

If right hand torque needs to be applied to the liner, the drill pipe string is lowered to disengage the cap and mandrel splines and collapse the slip joint. Right hand torque can then be applied through the drill pipe string to the bottom of the liner.

Once the liner is on bottom, the drill pipe string is picked up until the mandrel shoulders against the cap and the splines are engaged. The drill pipe string is then rotated to the left to disconnect the cap from the casing adapter. Conventional expansion procedures are then followed to cement and expand the liner.



SPLINES ENGAGED



SPLINES DISENGAGED

SUPERSEDES:

UNLESS OTHERWISE SPECIFIED:

1. REMOVE ALL BURRS & SHARP CORNERS.
2. [illegible]
3. DO NOT SCALE DRAWING.
4. ALL DIMENSIONS ARE IN INCHES.
5. [illegible]
6. MACHINE FINISH. 125

TOLERANCES — FABRICATION: ANGLES ±1° — MACHINE: ANGLES ±1/2°

DESIGNED	DPB	3-6 03
DRAWN BY	DPB	3-6 03

HALLIBURTON

TOOL ASSY. LINER RUNNING, TENSION TYPE, 7-5/8 29.7 LB/FT

SCALE	SHEET	CHG	
NTS	01 OF 01	A	F03.00153